ISSN 1346–7565 Acta Phytotax. Geobot. 56 (2): 127–128 (2005)

Claytosmunda; a New Subgenus of *Osmunda* (Osmundaceae)

YOKO YATABE[1], NORIAKI MURAKAMI[1] and KUNIO IWATSUKI[2]

[1]*Department of Botany, Graduate School of Science, Kyoto University, Kitashirakawa-Oiwake-cho, Sakyo-ku, Kyoto 606-8502, Japan;* [2]*The Museum of Nature and Human Activities, Hyogo, 6 Yayoigaoka, Sanda 669-1546, Japan*

Infrageneric system of the genus *Osmuda* is revised and a subgenus, *Claytosmunda*, is proposed as a monotypic subgenus based on *Osmunda claytoniana*.

Key words: *Claytosmunda*, new subgenus, Osmundaceae

While preparing floristic treatments for a number of projects, including the Flora of the World, Flora Malesiana, Flora of China, and so on, of the family Osmundaceae, we realized that it has become necessary to establish a new system for the family based on recent information from molecular systematics.

With few exceptions, the systematics of the Osmundaceae remained unchanged throughout the 20th century. Diels (1899) treated three genera, *Osmunda*, *Todea* and *Leptopteris*, in the family, and his system has generally been accepted throughout the 20th century (Kramer 1990). *Todea* and *Leptopteris* were considered to be closely related, but all the authors in 20th century treated them distinct generically. Tagawa (1942) proposed a system with five genera in the Osmundaceae, with *Osmundastrum* and *Plenasium* as distinct genera.

Miller (1971) after observing anatomical characters of the rhizome and stipe of fossils and extant materials, concluded that *Osmunda cinnamomea* occupied a distinct phylogenetic position from all the other extant members of *Osmunda*. His findings, however, have not been used by taxonomists in the generic and infrageneric treatment of the family.

The molecular systematic study of Yatabe *et al.* (1999) revealed six distinct clades in Osmundaceae. Among them, the monotypic clade of *Osmundastrum cinnamomea* was distinct from all the others.

The results of the two independent investigations show that a monotypic *Osmundastrum* should be recognized in the Osmundaceae. The other five clades comprise *Todea*, *Leptopteris*, *Osmunda claytoniana*, *Osmunda s. str.* and *Plenasium*. The last three may be placed in a single genus, *Osmunda*, which may better be classified into three subgenera: a monotypic subgenus based on *O. claytoniana*, *Osmunda s. str.* (3 species) and *Plenasium* (4 species). *Osmunda claytoniana* has always been related to *O. cinnamomea*, and it has no unique name of itself above the rank of species except one example, *Osmundastrum* series *Claytoniana* described by Bobrov (1967). To reflect the results of recent investigations, we propose a new, monotypic subgenus in Osmundaceae based on *O. claytoniana*.

Taxonomy

Osmunda L. subgenus **Claytosmunda** Y. Yatabe, N. Murakami & K. Iwatsuki, **subgen. nov.**

Osmundastrum series *Claytoniana* A. Bobrov,

Bot. Zhurn. 52: 1605 (1967).

Subgenus differt a subgen. *Osmunda* frondibus bipinnatifidis et partim dimorphis; a subgen. *Plenasium* frondibus papyraceis.

Type: *Osmunda claytoniana* L.

Subgenus *Claytosmunda* contains only *Osmunda claytoniana*, a species occurring disjunctly in temperate eastern Asia and North America, usually in marshy places and moist forests.

Discussion

Osmundaceae is usually considered to be the oldest family of leptosporangiate ferns with an origin in the Permian, or even separated from the leptosporangiate ferns and placed in the distinct order Osmundales (Reimers, 1954). The monophyly of the extant Osmundaceae is recognized by all recent taxonomists and supported by the molecular analysis of Yatabe *et al.* (1999).

The extant species of Osmundaceae have been placed in two genera, *Todea* and *Osmunda*, although the trend in the 20th century was to recognize three genera, *Todea*, *Leptopteris*, and *Osmunda*, the last of which was often subdivided into three subgenera, *Osmunda*, *Osmundastrum* and *Plenasium*. On the basis of anatomical studies of fossils and extant species, Miller (1971) questioned the accepted classification. Molecular systematic analysis of the family by Yatabe *et al.* (1999) supported Miller's anatomical studies and revealed *O. cinnamomea* to be distinct from all other species of Osmundaceae. All 20th century pteridologists, except Miller (1971), considered *O. claytoniana* and *O. cinnamomea* to be closely related because of their common frond construction. They used this feature as a key character to delimit *Osmundastrum* as either a distinct genus or as a subgenus of *Osmunda*. Tagawa included the two bipinnatifid species, *O. claytoniana* and *O. cinnamomea*, in his genus *Osmundastrum*. Based on comparative morphology and molecular studies, it appears clear that *Osmundastrum* should be recognized as a monotypic genus, including only *Osmundastrum cinnamomea*. The other bipinnatifid species, *O. claytoniana*, is placed in the monotypic subgenus *Claytosmunda*.

Concluding the above discussion, subdivision of the Osmudaceae will be summarized as follows:

Family Osmundaceae Berchtold & J. S. Presl (Pteridophyta - Filicales - Leptosporangiatae)
- Genus 1: *Osmundastrum* (C. Presl) C. Presl
- Genus 2: *Todea* Willd. ex Bernh.
- Genus 3: *Leptopteris* C. Presl
- Genus 4: *Osmunda* L.
  - Subgenus 1: *Claytosumunda* subgen. nov.
  - Subgenus 2: *Osmunda*
  - Subgenus 3: *Plenasium* (C. Presl) Milde.

We are grateful to Dr. David E. Boufford, Harvard University Herbaria, who read the manuscript and gave us a linguistic check and valuable comments.

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Received January 6, 2005: accepted April 4, 2005